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SILVICAL LEAFLET 36.

KNOBCONE PINE.

Pinus attenuata Lemmon.

Knobcone pine has no commercial value except, in rare cases, for fuel. It is of great importance, however, from a silvicultural standpoint, owing to its ability to grow in dry, steep localities, since it forms an excellent ground cover in regions where precipitation is light and uneven, and water conservation is important.

RANGE AND OCCURRENCE.

Knobcone pine ranges from southern Oregon, in the Coast Range, to the San Bernardino Mountains in southern California, and from the southern Cascades in Oregon along the northern Sierras to the Sierra National Forest in California.

It grows at altitudes of from 700 to 2,000 feet in southern Oregon and from 2,000 to 6,500 feet in the southern part of its range. In the south, however, it reaches its best development below 4,000 feet. It is most commonly found on dry, exposed, southeastern slopes, but occasionally in deep, secluded ravines. In southwestern Oregon it often forms pure stands of some size; in the foothills of the Sierras it occurs most often singly or in groups, while toward its upper altitudinal limit it forms open thin stands with yellow pine, sugar pine, incense cedar, and white fir; in the south it associates with bigcone spruce, Coulter and digger pines, and oaks.

CLIMATE.

Knobcone pine does not endure much cold; the seasonal range of temperature to which it is subjected runs from zero to 110° F. The annual rainfall may be as low as 8 inches, but in some parts of its range reaches 45 inches.

HABIT.

Knobcone pine is a tree of unique appearance. The crown is usually quite symmetrical and rather open. The cones are several inches long with great knobs on the ends of the scales. They are unsymmetrical

from the greater development of the under side, and grow in whorls, first around the main axis, later, as the tree grows older, around the larger branches also. The needles are rather long and dark green. The bole retains its branches almost to the ground, except in dense stands. Under the very best conditions a few old trees have been observed over 100 feet tall with a diameter of 3 feet, but the average size for mature trees is from 40 to 60 feet in height with a diameter of from 12 to 24 inches.

SOIL AND MOISTURE.

Almost any soil will suffice for the needs of knobcone pine. It grows on steep slopes, where the soil is rocky, gravelly, or sandy, and usually thin. It requires very little soil moisture; digger pine alone, of the California pines, exceeds it in adaptability in this respect.

TOLERANCE.

Knobcone pine is exceedingly intolerant and is unable to endure shade except in the very early seedling stage. In light requirements, as in ability to withstand drought, it is surpassed only by digger pine. When knobcone pine forms pure stands it is often very dense and endures side shading. It is then very resistant to fire.

REPRODUCTION.

It begins to bear cones early and produces them in great abundance every year. Old trees often bear as many as 500 cones to the tree, each cone having about 125 fertile seeds—more than 3.5 pounds to the tree, at the rate of 20,000 seeds to the pound. The seeds are winged and adapted for dissemination by wind. Fire is instrumental in opening the cones, and is usually followed by reproduction. The seeds remain in good condition for years in the closed cones and will germinate well when liberated, particularly on burned areas with exposed mineral soil. The seedlings grow rapidly until they reach the sapling stage, when they continue at a slower rate for the rest of their lives. The seedlings are fairly hardy.